BERGESON & CAMPBELL, P.C.
1203 Nineteenth Street, NW | Suite 300 | Washington, DC | 20036-2401 | *tel* 202.557.3800 | *fax* 202.557.3836 | *web* www.lawbc.com

MEMORANDUM

Via E-Mail

DATE: November 12, 2007

TO: Firm Clients and Friends

FROM: Bergeson & Campbell, P.C.

RE: EMPM Discusses Current Pesticide Modeling Issues

On October 30, 2007, the U.S. Environmental Protection Agency (EPA) convened a triannual Environmental Modeling Public Meeting (EMPM) in Arlington, Virginia, for presentation and discussion of current issues in modeling pesticide fate, transport, and exposure in support of risk assessment in a regulatory context. This memorandum summarizes information presented at the meeting.

Environmental Modeling for Assessment of Antimicrobial Chemicals

Norm Cook, Risk Assessment and Science Support Branch, Antimicrobials Division (AD), Office of Pesticide Programs (OPP), outlined AD's efforts to develop environmental exposure scenarios and modeling approaches. Cook stated that many scenarios for AD involve point source discharges; a variety of commercial, industrial, and residential use scenarios, outdoor scenarios, such as aquatic areas; and non-agricultural scenarios. Reviewing likely proposed use patterns, Cook stated that for antimicrobial pesticides, EPA believes that indoor applications typically present low environmental exposure. Applications in once-through industrial water systems or wastewater treatment applications, however, involve higher environmental exposures. Cook stated that environmental exposures are likely in the context of antifouling coatings, ballast water, and wood preservatives.

Aquatic Exposures

Cook stated that exposures that could occur in aquatic areas from applications of antimicrobial agents are easier to model than some others because EPA can use weight-to-weight calculations that are based on application rate and the area or volume of the aquatic area treated. Nonetheless, Cook indicated that EPA will consider other environmental models as appropriate. Cook stated that EPA's workhorse model is the probabilistic dilution model (PDM) module of the Exposure and Fate Assessment Screening Tool Version 2 (EFAST2), a screening level

model. EFAST2 is available at http://www.epa.gov/oppt/exposure/pubs/efast.htm. The PDM module, according to Cook, estimates downstream chemical concentrations in surface water from industrial discharge and the number of days the concentration of concern may be exceeded in a receiving stream. The model accounts for production volume, exposure duration, and concentration of concern.

For wastewater treatment plant discharges, EPA has considered using the Cornell Mixing Zone Expert System (CORMIX). CORMIX provides a modeling and decision support system that is designed for environmental impact assessment of mixing zones resulting from wastewater discharges from point sources.

Residential Scenarios

For residential and homeowner scenarios, EPA would likely use the Down-The Drain Model (DTD) module of EFAST2, a screening level model. According to Cook, this model can be used to assess chemical releases in household wastewater. The module estimates chemical releases into surface waters from household wastewater and assumes that household wastewater passes through a wastewater treatment plant.

Antifouling Coatings

For antifouling coatings, EPA presently uses the Organization for Economic Cooperation and Development (OECD) Emission Scenario Document (ESD) for Antifouling Products. EPA also uses the OECD's Marine Antifoulant Model to Predict Environmental Concentrations (MAMPEC).

Ballast Water

For ballast water, EPA is presently using OECD ESD. Cook stated that other models may be used, or a ballast water scenario may be added to MAMPEC.

Wood Preservatives

For wood preservatives, EPA is concerned about aquatic exposures from sapstain uses, soil exposures, soil-to-aquatic exposures, aquatic exposures, and exposures stemming from applications to roof shingles, railroad ties, and utility poles. According to Cook, the key to environmental estimates is the quantity of pesticide leached from treated wood. Cook stated that presently no one specific leaching method accurately predicts or quantifies leaching under all use conditions. He stated that different regulatory bodies use different leaching methods and that

OECD countries disagree on the appropriate leaching method to use. Cook stated that the OECD has assembled a workgroup to examine this issue.

In the context of wood preservatives, Cook stated that for sapstain modeling, EPA is presently using an approach that Environment Canada developed. For aquatic exposure modeling, EPA has developed a screening level dock scenario that uses the specific amount of treated wood, the volume of water, and leaching and retention rates to estimate the concentration of pesticide leaching out of the wood into the water. Cook stated that for decking and fencing, EPA is using the OECD ESD for wood preservatives to model soil and aquatic exposures. According to Cook, EPA is open to using other modeling approaches, and EPA has begun working with a contractor to develop a wood leaching mode. This effort is stalled, however, due to a lack of funding. Cook stated that the American Chemistry Council's Biocides Panel and Copper Re-Registration Task Force is working to develop environmental scenarios for various uses of copper products, including a scenario that involves shingles containing copper granules.

Conclusion

Cook concluded by stating that AD is in the early stages of environmental modeling development and use. AD, Cook stated, is examining the use of existing environmental models for various scenarios, is open to using appropriate models, and is willing to work with other EPA divisions, offices, regulatory authorities, or academia to develop environmental models.

Estimating Pesticide Exposure in Karst Watersheds

Mark Corbin, Environmental Fate and Effects Division (EFED), OPP, presented information relating to EPA's efforts to estimate pesticide exposure in watersheds in the context of the Barton Springs Salamander (BSS) assessments in karst watersheds in Texas. This work was undertaken to comply with requirements under the Endangered Species Act (ESA) and the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA).

New Approaches

Corbin described new approaches in the problem formulation phase, the analysis phase, and the risk characterization phase of the ecological assessment for BSS.

New Approach to Problem Formulation

Corbin stated that for the problem formulation phase, EPA was defining the action areas by the geology and hydrogeology of the region, and these aspects of the problem were well studied by the U.S. Geological Survey (USGS), among others. EPA also defined the problem based on monitoring data specific to the species habitat, and robust land use data that helped to define the uses. EPA believed that it needed to develop new approaches for exposure from non-agricultural use patterns and transport through karst. EPA reviewed aquifer, monitoring data, residential arrays, golf course locations, and rangeland. In addressing land use in the problem formulation, EPA allowed the assessment to address which uses should be assessed and which could be excluded. This information allowed EPA to provide context to the proximity of land use to the receptor of interest, all of which is critical information for development of an analysis plan, according to Corbin, because it ultimately provided information critical to the characterization of exposures.

New Approach to Analysis Phase

In the analysis phase for BSS, EPA determined that it needed to develop a new approach for modeling non-agricultural uses. EPA also believed that it needed to develop a new approach for estimating exposures from transport through karst, and how to account for multiple uses in the action area.

New Approach to Risk Characterization

Using knowledge of land use patterns to develop data for new scenarios, EPA used existing guidance to develop parameters for the data. For example, understanding residential uses, EPA determined the dominant soil type, the typical housing lot size, the likely amount of turf per lot, and information regarding impervious surface information. Then the weight model output was based on a percentage of the lot treated and the percent of imperious surface present in a watershed.

Conclusion

Corbin also discussed the new modeling approach for karst systems, which used significant research that USGS already conducted on the karst system and pesticide occurrence. Corbin concluded by referring the audience to the six assessments that have been completed for BSS. They are available at http://www.epa.gov/oppfead1/endanger/litstatus/effects/.

Simulating Residential Watersheds

R. David Jones, EFED, OPP, addressed OPP's efforts to simulate residential watersheds using the Pesticide Root Zone Model (PRZM) and the Exposure Analysis Modeling System (EXAMS). Jones provided an overview of typical turf scenarios, impervious surface scenarios, and overspray scenarios from residential applications. He applied these scenarios to oxamyl, as an example. Oxamyl, Jones explained, is a residentially applied insecticide that is mobile and not persistent. Jones explained the assumptions that EPA made for typical applications both per residence and within an entire water basin. Jones stated that EPA is currently working to build residential watersheds and residential scenarios for Florida and Pennsylvania, and develop a means to automate application data variation.

Additional Topics

Additional topics discussed at the EMPM included:

- ***Uncertainty with AGDISP***: Sources of uncertainty and data gaps in evaluating far field pesticide deposition using existing models, including a discussion of issues relating the small fraction of mass that is tracked with less certainty, even if the landing position of the vast majority of the mass is well known.

- ***Tier 2 Ecological Risk Assessment for Rice***: A proposed model is designed to mimic EFED's standard pond scenario developed for PRZM-EXAMS, and assumes a 10 hectare paddy draining into a 1 hectare by 2 meter water body. The model accounts for chemical loadings to the water body from spray drift, paddy overflow, and paddy drainage. The presentation concluded that RICEWQ is a good model and the audience and EPA were requested to use the model and provide reviews.

- ***Development of a National Turf Estimate***: The presentation discussed EPA's efforts to develop and validate a national turf estimate that includes drinking water intake catchment delineation. The information developed to date can be used to determine how much use is in each stream catchment, and how many acres of upstream use are in a given drinking water catchment. When completed, the spatial data archive can be used for improved modeling frameworks. Public access to the information is currently unavailable.

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We hope this information is helpful. As always, please call if you have any questions.